

INFLUENCE OF CULTURE AND CULTURAL DIFFERENCES ON SUPPLY CHAIN RISKS

Sakgasit Ramingwong

Department of Computer Engineering, Faculty of Engineering, Chiang Mai University, Chiang Mai, Thailand

Abstract

Culture is an important element which affects human behavior. Cultural differences can either benefit or ravage every human related activity. Almost all supply chain activities are inevitably involved with human resources. This paper focuses on risk management in supply chain based on influence from culture and cultural differences. It analyzes possibilities and impacts of risks which can be revised in global supply chain scenarios. Hofstede's theory of cultural dimensions is used for analyzing relationships between culture and top supply chain risks.

Keyword

Risk management, supply chain risks, supply chain management, culture

Introduction

Supply chain is an essential system which link between manufacturers and consumers. It is one of the most important factors which determine competitiveness in modern industry. As technology develops, supply chain management has become increasingly essential to all kinds of business. Indeed, a risk in supply chain could lead to major loss if not mitigated properly and timely. However, managing risks in supply chain can be complicated since there are many factors involved.

Human resources are key element in a supply chain. Indeed, although several supply chain activities can be automated, human are still largely needed for an assurance of smooth operations. On the other hand, human can undeniably become a major risk factor. This challenge tends to further intensify in scenarios which involve international stakeholders due to the fact that people from different cultural background are likely to perceive and act diversely on the same environment or stimuli (Weisinger & Trauth, 2002). As a result, special attentions and appropriate mitigations would be needed for certain situations.

There is a great number of risks throughout an entire supply chain (Wieczorek, 2012). Few of these risks include major unpredictable and uncontrollable phenomenon such as natural disasters and terrorisms. Some of them, such as fluctuated exchange rates and uncertainty in demand, are very difficult to predict. Yet, other risks, such as labor dispute and contracting, are presumably easier to accurately forecast and hence efficiently mitigate. Many of the latter risks are human related and can be influenced by culture.

Cultural dimension is a theory which describes human behaviors based on five characteristics i.e. societal inequity, individualism, gender inequity, risk perception and time perception (Hofstede, 1997). The main benefit of this theory is that it represents a set of relative cultural scores for a number of countries. As a result, it is possible to determine whether if a country is more likely to be more susceptible to certain challenges if compared to another country.

This paper attempts to utilize the theory of cultural dimensions to explain and determine its connection and potential effects to top supply chain risks. Cultural dimensions are described in the second section. Then, the third section of this paper discusses top risks in supply chain management. The fourth section analyzes relationships and potential impact of cultural dimensions on top supply chain risks. Finally, the fifth section concludes this paper.

Cultural Dimension

Cultural dimension is a theory which suggests that normal human behaviors can be explained from five different perspectives as follows (Hofstede, 1997):

- Power distance index (PDI). This cultural index signifies the degree of perceived societal inequity. A high PDI value indicates a culture which people with high seniority, wealth, social ranks and educational level are more respected than other. In contrast, a low PDI index indicates more equality in the community.

- Individualism (IDV). Individualism index illustrate preferences towards objectives. People from high IDV communities tend to prioritize their goals over their group agenda. On the other hand, a low IDV indicates a collectivist community which regards group objectives as their top priority.
- Masculinity (MAS). This cultural value identifies competitiveness and gender equality. A high MAS indicates a society which are more masculine, i.e. highly competitive and male dominated. In contrast, a low MAS implies a feminine culture which people live more peacefully.
- Uncertainty avoidance (UAI). UAI denotes the perception towards challenges. In a high UAI community, people tend to avoid risky and unfamiliar scenarios. On the other hand, people from a low UAI society are more likely take risks.
- Long term orientation (LTO). LTO suggests community's perspectives on time. People with high LTO are able to sacrifice short term objectives in order to achieve their long term goal. On the contrary, low LTO people are more focused on short term results.

Table 1 illustrates cultural dimension score from various key supply chain countries based on a landmark survey in 1994 (Hofstede, 1997). Each cultural dimension score from 0 to 100, with a few exceptional cases which have scores of more than the expected maximum value. These cultural score are relative and are generally used for comparison.

Country	PDI	IDV	MAS	UAI	LTO
<i>Africa</i>					
West Africa	77	20	46	54	16
South Africa	49	65	63	49	-
<i>America (Central)</i>					
Costa Rica	35	15	21	86	-
Mexico	81	30	69	82	-
<i>America (North)</i>					
Canada	39	80	52	48	23
United States	40	91	62	46	29
<i>America (South)</i>					
Argentina	49	46	56	86	-
Brazil	69	38	49	76	65
<i>Asia (East)</i>					
China	80	20	55	30	118
Japan	54	46	95	92	80
South Korea	60	18	39	85	75
<i>Asia (Southeast)</i>					
Malaysia	104	26	50	36	-
Singapore	74	20	48	8	48
Thailand	64	20	35	64	56
Vietnam	70	20	40	30	80
<i>Asia (South)</i>					
India	77	48	56	40	61
Pakistan	55	14	50	70	0
<i>Australia</i>					
Australia	36	90	61	51	31
New Zealand	22	79	58	49	30
<i>Europe (East)</i>					
Czech Republic	57	58	57	74	13
Russia	93	39	36	95	-
<i>Europe (North)</i>					
Finland	33	63	26	59	-
Ireland	28	70	68	35	-
United Kingdom	35	89	66	35	25
<i>Europe (West)</i>					
France	68	71	43	86	-
Germany	35	67	66	65	31
Spain	57	51	42	86	-

Table 1: Cultural scores of major countries (Hofstede, 1997)

The relative score in Table 1 suggests expectable cultural differences between countries. Considering PDI scores for example, if a Chinese (PDI=80) firm plans to establish a supply chain with an American (PDI=40) company, a large cultural gap should be expected. In this case, the Chinese could feel that the American do not respect on seniority or educational background as much as they experienced in their home country. Yet, if this Chinese firm expand their business to Singapore (PDI=74), they should feel that Singaporean have similar perspective towards these societal powers.

It can be seen from Table 1 that countries from the same region usually have similar cultural scores. On the other hand, major gaps can be generally found in countries from different regions. For example, relative PDI and IDV scores of most Asian countries and North American nations are completely opposite. This reveals significant cultural differences which can potentially affect risks in supply chain management.

Top Risks in Supply Chain Management

There are a number of risks involved in the cycle of supply chain management. The possibility and impact of each risk can be varied based on particular stakeholders, scenarios and environments. Among them, there are a number of challenges which are frequently addressed.

Chopra and Sodhi (2004) defined nine categories of risks. Firstly, disruption risks involve risks which can extensively interrupt the entire chain of supply. Disruption risks include natural disasters, labor dispute and supplier bankruptcy. The second category, delays risks, signifies risks which can setback the process such as problems on the supply source and change in transportation modes. System risks, as the third category, include challenges from platform and infrastructure such as difficulties of system integration and infrastructure breakdown. Fourthly, forecast risks comprise potential errors from forecasting. The fifth risk category is intellectual property risks. This includes various forms of poor intellectual property protection in global supply chain scenarios. Procurement related risks such as fluctuated currency exchange rate and difficult contract management are classified as the sixth category. Seventhly, receivable risks incorporate customer related challenges such as unpredictable number of customers as well as their financial strength. Then, inventory risks such as increasing holding costs and depreciation are considered as the eighth category of risks. Lastly, capacity-oriented matters such as increasing costs and flexibility of capacity are categorized as capacity risks. It can be seen from this list that the majority of supply chain challenges are related to business environments. Human related risks, on the other hand, are comparatively smaller in numbers.

The McKinsey Quarterly published a global survey on supply chain risks in 2006 (Muthukrishnan & Shulman, 2006). Based on more than three thousand respondents, labor challenge is found to be the most concerned issue. This includes availability, cost, and quality of the labors. The other highly disturbing risks comprise regulatory concern, reliability of suppliers, shortage of commodities, fluctuation of prices and intellectual property theft. War, terrorism, natural disasters, political instability and infrastructure breakdown are also raised as major risks by the participants. This paper highlights the importance and difficulties of human resource management in supply chain.

Global Risk 2013 report published by World Economic Forum divides modern global risks into four categories (World Economic Forum, 2013). Firstly, economic risks involve variety of imbalance economic elements such as income disparity, failure of financial systems, inflation and deflation, liquidity crises and increasing prices of energy and agriculture products. Secondly, environmental risks include growing level of greenhouse gases, rapid change of climate, extreme weather, pollution, mismanaged utilities and mismanaged urbanization. The third category, geopolitical risks, comprises risks from international issues such as failed governance, corruption, organized crime and terrorism. Fourthly, societal risks delineates rising threats on communities such as shortage of food and water supply, religious fanaticism, unsustainable population growth and rising rates of chronic diseases. The last category of risks is outlined as technological risks. This includes cyber attacks, failure of critical systems, fraud, technology theft and failure in intellectual property protection. Although this paper discusses on risks in general, a number of risks are largely related to supply chain.

This paper simplifies the categorization of risks by adopting the concept from World Economic Forum (2013). Another risk category, management, is added in order to expand the list to cover managerial issues such as skills and costs of workforce. As a result, risks are divided into six categories, i.e.

economic, environmental, geopolitical, societal, technological and management. Table 2 demonstrates the collection of supply chain risks derived from ten selected literature and business reports.

Type	Risks	Citation	Count
Economic	Fluctuated product price and value	(Chopra & Sodhi, 2004; Enslow, 2012; Muthukrishnan & Shulman, 2006; Rao & Goldsby, 2009; Tang, 2006; Wagner & Bode, 2006; World Economic Forum, 2013)	7
	Fluctuate demand and supply	(Chopra & Sodhi, 2004; Christopher & Peck, 2004; Enslow, 2012; Rao & Goldsby, 2009; Tang, 2006; Wagner & Bode, 2006)	6
	Instability of production	(Christopher & Peck, 2004; Muthukrishnan & Shulman, 2006; Rao & Goldsby, 2009; Tomlin, 2006; Wagner & Bode, 2006)	5
	Fluctuated currency exchange rate	(Chopra & Sodhi, 2004; World Economic Forum, 2013)	3
	Bullwhip effect	(Chopra & Sodhi, 2004; Wagner & Bode, 2006)	2
	Income disparity	(World Economic Forum, 2013)	1
	Failure in financial system	(World Economic Forum, 2013)	1
	Inflation and deflation	(World Economic Forum, 2013)	1
	Financial strength of customer	(Chopra & Sodhi, 2004)	1
	Inventory holding cost	(Chopra & Sodhi, 2004)	1
	Utility and capacity costs	(Chopra & Sodhi, 2004)	1
	Environmental	Natural disasters	(Chopra & Sodhi, 2004; Christopher & Peck, 2004; Enslow, 2012; Muthukrishnan & Shulman, 2006; Rao & Goldsby, 2009; Wagner & Bode, 2006)
Extreme weather		(Christopher & Peck, 2004; World Economic Forum, 2013)	2
Mismanaged use of utilities and capacity		(Chopra & Sodhi, 2004; World Economic Forum, 2013)	2
Industrial waste		(Blanchard, 2009)	1
Rising of greenhouse gases emission		(World Economic Forum, 2013)	1
Mismanaged urbanization		(World Economic Forum, 2013)	1
Failure of climate change adaptation		(World Economic Forum, 2013)	1
Pollution		(World Economic Forum, 2013)	1
Geopolitical	Terrorism	(Chopra & Sodhi, 2004; Muthukrishnan & Shulman, 2006; Rao & Goldsby, 2009; Wagner & Bode, 2006; World Economic Forum, 2013)	5
	Regulatory concern	(Christopher & Peck, 2004; Muthukrishnan & Shulman, 2006; Rao & Goldsby, 2009; World Economic Forum, 2013)	4
	War	(Chopra & Sodhi, 2004; Muthukrishnan & Shulman, 2006; World Economic Forum, 2013)	3

Type	Risks	Citation	Count
Table 2: Top cited risks in supply chain management			
Societal	Poor governance	(World Economic Forum, 2013)	1
	Failure of diplomatic conflict resolution	(World Economic Forum, 2013)	1
	Organized crime	(World Economic Forum, 2013)	1
	Corruption	(World Economic Forum, 2013)	1
	Political instability	(Rao & Goldsby, 2009)	1
	Water supply shortage	(World Economic Forum, 2013)	1
	Food shortage	(World Economic Forum, 2013)	1
	Religious fanaticism	(World Economic Forum, 2013)	1
Technological	Ageing population	(World Economic Forum, 2013)	1
	Unsustainable population growth	(World Economic Forum, 2013)	1
	Diseases and pandemics	(World Economic Forum, 2013)	1
	Unmanaged migration	(World Economic Forum, 2013)	1
	Breakdown of infrastructure or machines	(Christopher & Peck, 2004; Enslow, 2012; Muthukrishnan & Shulman, 2006; Rao & Goldsby, 2009)	4
	Intellectual property theft	(Chopra & Sodhi, 2004) (Enslow, 2012; Muthukrishnan & Shulman, 2006; World Economic Forum, 2013)	4
	Accident	(Christopher & Peck, 2004; Wagner & Bode, 2006)	2
	Inadequate infrastructure	(Blanchard, 2009; Muthukrishnan & Shulman, 2006)	2
	Failure of critical systems	(Chopra & Sodhi, 2004; World Economic Forum, 2013)	2
	Obsolescence technology	(Muthukrishnan & Shulman, 2006)	1
	Cyber attacks	(World Economic Forum, 2013)	1
	Unforeseen sequences of new technology	(World Economic Forum, 2013)	1
	Ineffective system integration	(Chopra & Sodhi, 2004)	1
	Unforeseen sequences from E-Commerce	(Chopra & Sodhi, 2004)	1
Physical security	(Blanchard, 2009)	1	
Management	Poor reliability of supplier	(Blanchard, 2009; Chopra & Sodhi, 2004; Christopher & Peck, 2004; Enslow, 2012; Muthukrishnan & Shulman, 2006; Rao & Goldsby, 2009; Tomlin, 2006; Wagner & Bode, 2006)	8
	Delay on shipment and uncertain lead time	(Blanchard, 2009; Chopra & Sodhi, 2004; Christopher & Peck, 2004; Enslow, 2012; Tang, 2006; Tomlin, 2006)	6
	Labor dispute	(Chopra & Sodhi, 2004; Rao & Goldsby, 2009; Wagner & Bode, 2006)	3
	Over dependency to supplier	(Chopra & Sodhi, 2004; Christopher & Peck, 2004; Wagner & Bode, 2006)	3
	Poor quality or yield from supplier	(Chopra & Sodhi, 2004; Tang, 2006; Tomlin, 2006; Wagner & Bode, 2006)	3

Type	Risks	Citation	Count
Table 2: Top cited risks in supply chain management (Continued)			
	Difficulty in contract management	(Chopra & Sodhi, 2004; Rao & Goldsby, 2009; Tang, 2006)	3
	Inappropriate mode of transportation	(Blanchard, 2009; Chopra & Sodhi, 2004)	2
	Reliability of transportation	(Christopher & Peck, 2004; Wagner & Bode, 2006)	2
	Inappropriate manufacturing process	(Blanchard, 2009; Christopher & Peck, 2004)	2
	Low availability of labor	The McKinsey Quarterly (2006); Rao & Goldsby (2009);	2
	Inaccurate forecast	(Chopra & Sodhi, 2004; Tang, 2006)	2
	Distorted information	(Tang, 2006; Wagner & Bode, 2006)	2
	Different labor policy	(Blanchard, 2009)	1
	High cost of labor	(Muthukrishnan & Shulman, 2006)	1
	Low quality of labor	(Muthukrishnan & Shulman, 2006)	1
	Poor brand reputation	(Enslow, 2012)	1

Table 2: Top cited risks in supply chain management (Continued)

As can be seen from Table 2, supply chain management involves in a number of risks. Yet, only a set of certain risks are commonly raised in recent scholarly literatures. From more than sixty risk items, only seven of them are addressed by at least half of the selected papers. Management and economic risks unsurprisingly dominate the majority of the concerns. The challenges which are addressed by more than half of these scholarly literatures are listed as follows:

- Poor reliability of supplier
- Fluctuate product price and value
- Fluctuate demand and supply
- Delay on shipment and uncertain lead time
- Natural disasters
- Instability of production
- Terrorism

Potential Impact of Cultural Differences on Supply Chain Risks

Based on the aforementioned findings, top supply chain risks includes poor reliability of supplier, fluctuate product price and value, fluctuate demand and supply, delay on shipment and uncertain lead time, natural disasters, instability of production, and terrorism. This section analyzes and suggests potential impacts of cultural dimensions of supply chain stakeholders on each of these risks.

Poor reliability of supplier

This risk mostly involves capacity and reliability of the suppliers on successful delivery of the products. Societal inequity and masculinity do not seem to have any connections to this challenge. In contrast, individualism and long term orientation may have certain affects. Since low individualism communities usually prioritize mutual objective, the supply chain stakeholders should strive to meet each other's demands. This is likely to happen more often in countries with higher long term orientation scores and high uncertainty avoidance because the people tend to prefer long term cooperation with familiar counterparts.

Fluctuate product price and value

Product price and value can be changed by an infinite issue. However, culture is not likely to be one of these drivers.

Fluctuate demand and supply

Demand and supply can be very fluctuating in extreme scenarios. Despite the fact that this risk can be human driven, culture does not seem to be a major drive of this risk. It is possible that in a community with low masculinity, the low competitive nature could influence the demand and supply to be more stable. Yet, this relationship is not likely to be significant.

Delay on shipment and uncertain lead time

Delay on shipment and uncertain lead time are mostly caused by disruption of logistic activities. Culture is not likely to be the source of this risk. On the contrary, certain cultural dimensions can exacerbate its outcome. For example, in a high societal inequity culture, people can feel more awkward to directly express problems or reveal negative information which can damage their reputation to their superiors or partners. This can cause false expectation and result in major inaccuracy in supply chain forecasting.

Natural disasters

Natural disasters are major risks which are uncontrollable yet extremely destructive. Yet, cultural differences are obviously not related to them.

Instability of production

Production stability involves problems in the manufacturing lines which cause disruption to the chain of supply. Since production generally involves human resources, cultural differences can play an important role on this risk. Individualism, uncertainty avoidance and long term orientation seem to be the most relevant cultural dimensions which influence production stability in the same way as one of the previous risk, supplier reliability. This challenge could be relatively less likely to happen in a society with low individualism, high uncertainty avoidance and high long term orientation.

Terrorism

Terrorism is a very damaging risk and it is never easy to be predicted. It is illogical to claim that culture and terrorism are related.

Table 3 summarizes potential associations between cultural dimensions and frequently cited supply chain risks. It can be seen that most of these risks are not clearly related to culture. Yet, all of the five cultural dimensions seem to have connections to at least one risk. Indeed, the degree of impact is related to the degree of cultural difference between the supply chain stakeholders. The uprising arrows in Table 3 indicate positive relationships while the downward arrows suggest otherwise. For example, the fluctuate demand and supply could be lower in a lower masculinity culture.

Risks	PDI	IDV	MAS	UAI	LTO
Poor reliability of supplier		↑		↓	↓
Fluctuate product price and value					
Fluctuate demand and supply			↓		
Delay on shipment and uncertain lead time	↑				
Natural disasters					
Instability of production		↑		↓	↓
Terrorism					

Table 3: Expected relationship between cultural dimensions and top supply chain risks

Conclusions

This paper divides risks in supply chain management into six categories, i.e. economic, environmental, geopolitical, societal, technological and management. Based on a review of selected literature seven risks are found to be most frequently cited. These risks includes poor reliability of supplier, fluctuate product price and value, fluctuate demand and supply, delay on shipment and uncertain lead time, natural disasters, instability of production, and terrorism.

Culture is an important foundation of communities. A study on culture suggests that this essential element can be divided into five dimensions. These comprise power distance index, individualism, masculinity, uncertainty avoidance, and long term orientation. A collection of relative cultural scores from various countries are reported. Interestingly, countries within the same region are likely to share similar culture. However, such culture might be completely different in other regions. This can result in cultural clash in cooperative activities, including supply chain management.

Based on assumptions, this paper suggests that culture can have effects on top supply chain risks. Yet, these effects may not be significant as most frequently cited risks are not directly human related. In fact, not only the top referred but also the majority of other less frequently cited supply chain challenges are not significantly related to culture. This fortunate finding suggests that cultural differences might not significantly affect supply chain management.

Nonetheless, managing culture can definitely the overall efficiency of the supply chain. Although not significantly related to the top risks, cultural differences often exacerbate trivial issues into major problems. Building a strong organizational culture can considerably lessen the influence of national culture. This could also apply to building a sustainable culture of the entire supply chain.

References

- Blanchard, D. (2009). Top Five Supply Chain Risk Factors. Retrieved 20 May 2013, from <http://www.industryweek.com/environment/top-five-supply-chain-risk-factors>
- Chopra, S., & Sodhi, M. S. (2004). Managing Risk to Avoid Supply-Chain Breakdown. *MIT Sloan Management Review*, 46(1), 53-61.
- Christopher, M., & Peck, H. (2004). Building the Resilient Supply Chain. *The International Journal of Logistics Management*, 15(2), 1-14.
- Enslow, B. (2012). Tackling the Rising Supply Chain Risk Threat. Retrieved 20 May 2013, from [http://www.mmc.com/knowledgecenter/viewpoint/Tackling the Rising Supply Risk Threat.php](http://www.mmc.com/knowledgecenter/viewpoint/Tackling_the_Rising_Supply_Risk_Threat.php)
- Hofstede, G. (1997). *Cultures and Organizations: Software of the Mind* (2nd ed.). New York: McGraw-Hill.
- Muthukrishnan, R., & Shulman, J. A. (2006). *Understanding Supply Chain Risk: A McKinsey Global Survey*. (M. Company o. Document Number)
- Rao, S., & Goldsby, T. J. (2009). Supply Chain Risks: A Review and Typology. *The International Journal of Logistics Management*, 20(1), 97-123.
- Tang, C. S. (2006). Perspectives in Supply Chain Risk Management. *International Journal of Production Economics*, 103(2), 451-488.
- Tomlin, B. (2006). On the Value of Mitigation and Contingency Strategies for Managing Supply Chain Disruption Risks. *Management Science*, 52(5), 639-657.
- Wagner, S. M., & Bode, C. (2006). An Empirical Investigation into Supply Chain Vulnerability. *Journal of Purchasing and Supply Chain Management*, 12(6), 301-312.
- Weisinger, J. Y., & Trauth, E. M. (2002). Situating Culture in the Global Information Sector. *Information Technology & People*, 15(4), 306-320.
- Wiczorek, E. (2012). Supply Chain Risks. In C. Raimbault & A. Barr (Eds.), *Emerging Risks: A Strategic Management Guide* (pp. 241): Gower Publishing, Ltd.
- World Economic Forum. (2013). *Global Risks 2013* (Eight ed.): World Economic Forum.